

**MATH 217 W24 - LINEAR ALGEBRA, Section 001 (Dr. Paul Kessenich)**  
**Homework Set Part B due ??? at 11:59pm**  
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1. Question

- (a) Prove that  $F$  is alternating if and only if  $F(\vec{u}, \vec{v}) = -F(\vec{v}, \vec{u})$  for all  $\vec{u}, \vec{v} \in \mathbb{R}^2$ .

**Solution:** By bilinearity, we know

$$F(u + v, v + u) = 0$$

$$F(u, v + u) + F(v, v + u) = 0$$

$$F(u, v) + F(u, u) + F(v, v) + F(v, u) = 0$$

$$F(u, v) + 0 + 0 + F(v, u) = 0$$

$$F(u, v) + F(v, u) = 0$$

$$F(u, v) = -F(v, u)$$